

Suggestions for Information Kiosk Systems using the World Wide Web

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Abstract

Information kiosks provide users with access to community and local information in an easily understandable format. They are designed to be used by the average user who has little or no experience with computer or information systems. Kiosk-based information systems are already available at a variety of locations from airports to shopping malls to community information centers.

The World Wide Web has provided the Internet with an easy interface superceeding other access systems with its popularity and its capabilities. The Web naturally lends itself to a distributed kiosk-based information system although there are special requirements for such a system that current Web clients and servers do not provide.

In this paper we examine the requirements that an information kiosk system based upon the World Wide Web must have before it can be widely accepted as a distributed information system for commercial and non-commercial needs.

Introduction

A Kiosk-based Information system has many requirements to create the most user-friendly interface while maintaining security and functionality. *User-friendliness* is the most important factor for a public access information system because of the nature of the majority of its customers as non-computer professionals. Other factors that must also be considered for these systems are the functionality and security of the servers.

The Effectiveness of the World Wide Web as Kiosk-based Information System

The first question that should be asked is why one would use the World Wide Web as a design for a kiosk-based information system. We have identified the reasons why the Web is ideally suited for this application:

- the Web has proven itself as a successful networked information system through its popularity on the Internet.

EXHIBIT

- a multimedia tool is the primary type of program used by information systems because of the combination of text, graphics and sound are more appealing. The many different Web browsers have these capabilities already.
- the Web is part of the Internet. This allows users access to the many services on the Internet.
- the ability of the Web to access other programs and services allows programmers to extend the capabilities of the server.
- the Web is a widely accepted standard as opposed to proprietary commercial multimedia systems which holds promise for its growth and development.

Who will use these systems?

The next question asks who will actually implement and who will use these systems. There has been varied interest by commercial and non-commercial organizations in the World Wide Web. Currently there are several projects underway to develop a commercial version of popular Web browsers as well as commercial services for these browsers.

The following are some examples of who might implement such kiosk-based information systems:

- Commercial, educational and governmental organizations who need to provide in-house information systems about their products and services. For example, hotels, amusement parks, shopping malls, etc.
- Communities and organizations who want to install public access booths to provide community information at key locations within the community, such as community information networks, University campuses, Airport authorities, etc.
- **Commercial Information Referral organizations who wish to provide a paid service through such kiosks.**

The Access Interface

The Access Interface comprises both the programs as well as the computer hardware necessary for a kiosk-based information system. This includes the Web browser or client program, the output hardware (the visual display unit, a sound system, printing systems), the input hardware (touch-screen systems, keyboards, light-pens & stylus, keypads, etc.), the kiosk-local processing hardware (if any), kiosk-local cache or information storage (if any), and the network connection hardware.

The user interface or Web browser will be accessed by the average user who may have very little or no experience with computer system. The user interface for a kiosk-based information system should be:

- Easy to use controls. Controls for the kiosk system should be understandable and easy to handle.
- Easy to understand information display. The text or visual information should be easily readable and understood in content and form by the user.
- Access to contents should be as direct as possible. The user should have to go through as few steps as possible for to reach the information they require.
- Documents should be transferred in as short an access time as possible or present a failed message if the time to access the document is longer than a certain amount considered as $t=\infty$.
- The program interface should be able to return to a default home page automatically when left idle for an extended period of time.
- The physical unit should be reasonably secure to tampering or vandalism so as not to provide incorrect information.

The following are suggested requirements for an access interface based upon the above suggestions:

- **Physical Requirements**

- A minimal number of input devices so as not to confuse the user.
- Easy to use input devices such as a touch-screen or stylus based system
- The unit must be at an adequate height so that it is accessible by most people including handicapped users.
- The output devices should be easy to understand. Visual display output devices should be large enough to be read without difficulty by any type of user. A sound system should be clear enough to be understood but not loud enough to offend.
- Security against vandalism or theft of the kiosk should be maintained.
- A set of clear operating instructions for the booth must be displayed in some form on the physical unit of the booth to ensure proper usage.

- **User Interface Program**

- Non-essential items such as buttons or menubars not directly related to the content of each page or not required for the correct usage of the system should not appear. Such items may also give a user access to secure or incomplete areas of the Web space.
- A common device such as a toolbar should always be present to provide users with a central control mechanism to the interface system. For example, users may wish to return to the home page or skip back to previously viewed pages. This device should be modifiable to the requirements of specific installations.
- Support for internationalization and non-English languages and character sets.
- The program should be able to keep track of the history of documents accessed by the user. It should be able to understand different usage sessions counting each session as one beginning from the home page. It should remove the history of access from previous sessions.
- It may be able to display graphics and movies and play digitized sounds and voice overs.
- It may be able to launch other programs to be presented upon the same output devices.
- There should be a diagnostic mode for servicing the program or the kiosk-local system.

The Server

There are also suggested requirements for the Server program for these information kiosk systems.

Commercial organizations will most likely have an invested interest in such information kiosk systems and may require that certain procedures should be followed by the servers for these systems.

Note that each kiosk may be a standalone system containing all the local information and with a link to the rest of the network. This would be a fast but costly system since the information requested the most often would be on local storage media. This may also be difficult to implement and maintain if there is a large amount of data. However, it will reduce the cost of the network link if a non-permanent circuit or dial-up connection is used.

Each kiosk may in turn be a client only system which access the information over the network link from a remote server and caches the information locally. To transfer the information from the server down to the kiosk may take some time but it saves cost and reduces the maintainence. **This may be expensive if network connect time charges are expensive.**

Functionality

contain restricted documents but data managers may wish to restrict certain areas of their Webspace dependent upon their own criteria.

Control

Control involves the access to the server and kiosk system for diagnostic examinations and also modification of the information space. Control is tied in very closely with security.

Operators and Data Managers may wish to log access to documents for statistical analysis. Keeping accurate logs of document access can help administrators anticipate growth of the installation.

Each installation should be able to decide which URI's are accessible through their server. Some installations may decide that they do not wish to provide their kiosks with access to the "news" or "mailto" services.

Commercial organizations may also wish to charge customers for access to specific documents or services. The concept of registered users and billing may be built into the server.

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Functionality of the server is key to its success. The more special functions it serves and the greater the extensibility of the server program, the better its chances of success as a popular system.

The server should be able to access foreign databases which act as storehouses of raw data. The server should be able to locate these databases and the information within with the least amount of processing or translation.

The server should have good support for graphics and graphical enhancements. The concept of imagemaps are almost a must. Mapping between commands and images enhances the ease of use of system. Also useful would be a reverse of the imagemap concept where a user selects an item or enters a piece of text and its corresponding image is displayed.

Storage and Transfer

Since these kiosks may be located at remote sites, the problems of data storage, caching and transfer becomes important especially considering that the information has to be presented in a rapid and predictable manner.

The problems of data storage are directly related to the actual implementation and hardware requirements of the system. Although no specific suggestions have been made as to the actual computer system required for a kiosk-based information system, the general trend is to use cheaper and cost-effective equipment to reduce the problems of theft, vandalism, or damage.

If the server and data is located locally, the kiosk would only require to use the network when accessing remote documents. The kiosk-local computer system would not require a very large cache area since the documents can be accessed very rapidly.

If the server is located remotely more considerations come into play. The server must be able to respond and transfer documents in a limited amount of time over the network link. Servers might also be able to offload requests to other similar servers when they are too busy to respond. This suggests a form of server to server communication and load-balancing which is currently *not* a part of the HTTP specification. The data may require to be replicated across several storage systems and duplicate servers on other computer systems may be necessary as a failsafe measure to ensure constant access.

Security

Security of the server depends upon the type of implementation of the kiosk, whether standalone or remote server based. However, certain common elements exist in both, such as physical access to the server's computer system. Access to the console of the server should only be allowed to secure personnel to ensure the safety of the information.

Network security is another issue. Access to the computer network that the servers are located on should be secure to reduce the chance of computer cracking or vandalism of the information. Since most servers run on common operating systems such as UNIX, VMS, etc., operating system security is also a crucial element in the safety of the information.

Data managers should decide upon a protocol for operator access, updating and maintenance of the information since it can affect the lives of many others.

Another form of access is dependent upon the content of the documents. A public system will not often